

Claims

1. A system for blending at least two materials, comprising:

a blend chamber that includes

a first inlet to receive a first material, the first inlet being connected to a first valve to

control an amount of the first material received at the first inlet; and

a second inlet to receive a second material, the second inlet being connected to a

second valve to control an amount of the second material received at the second inlet;

a recirculation line connected to the blend chamber to receive a mixture of the first material and the second material and provide the mixture of the first material and the second material back to the blend chamber;

a sensor, disposed in the recirculation line, to sense the amount of the second material mixed in the mixture of the first material and the second material;

a controller, connected to the sensor and the second valve, to control the amount of the second material received at the second inlet to achieve a desired concentration of the second material in the mixture.

2. The system of claim 1, wherein the recirculation line includes:

an inlet connected to the blend chamber to receive the mixture of the first material and the second material;

an outlet connected to the blend chamber to provide the mixture of the first material and the second material back to the blend chamber; and

a pump, to receive the mixture of the first material and the second material from the inlet of the recirculation line and pump the mixture to the outlet of the recirculation line.

3. The system of claim 2, further comprising:

an outlet, connected to the recirculation line and disposed between the pump and the outlet of the recirculation line, to provide the mixture to a tool.

4. The system of claim 3, wherein the sensor is a conductivity sensor.

5. The system of claim 1, wherein the sensor is a conductivity sensor.

6. The system of claim 1, further comprising:
an outlet, connected to the recirculation line, to provide the mixture to a tool.

5 7. A method of blending at least two materials to a desired concentration, comprising
acts of:
providing a first material in bulk to a blend chamber;
providing a flow of a second material to the blend chamber through a second inlet;
mixing the flow of the second material into the first material in the blend chamber to create
10 a mixture;
recirculating the mixture in the blend chamber;
measuring a characteristic of the mixture during the act of recirculating; and
adjusting the flow of the second material to the blend chamber to attain the desired
concentration.

15 8. The method of claim 7, wherein the act of measuring a characteristic of the mixture
comprises sensing a characteristic indicative of concentration.

9. The method of claim 7, wherein the act of providing the first and second materials
20 occurs without knowing the concentration of the first and second concentration.

10. The method of claim 7, wherein the act of providing the first and second materials
occurs without using a mass flow controller.

25 11. The method of claim 7, further comprising draining a portion of an out of
specification blend and leaving the remaining portion of the out of specification blend in the blend
chamber.

30 12. The method of claim 11, further comprising providing an additional amount of the
first and second materials.

13. A system for blending at least two components comprising:

a blend chamber having:

a first inlet for receiving a first component;

a second inlet for receiving a second component;

an outlet for delivering a mixture of the first component and the second component

5 to a tool;

an inlet and an outlet for a recirculation line;

means for analyzing the mixture in the recirculation line and adjusting the rate at which the second component is added to the blend chamber.

10 14. The system of claim 13, further comprising means for correcting a batch during physical blending process and adjusting the rate at which a liquid chemical stream is added to the batch allowing the stream to reach the required endpoint

15 15. The system of claim 14, further comprising means for correcting an out of specification blend while blending.